Summary of Safety and Effectiveness Data

I. General Information

Device Generic Name	Full-Field Digital Mammography X-ray System
Device Trade Name	Lorad Digital Breast Imager (LDBI)
Applicant's Name and Address	Hologic, Inc. 35 Crosby Drive Bedford, MA 01730
PMA Number	P010025
Date of Good Manufacturing Inspection:	December 10 and 18, 2001
Date of Notice of Approval to the Applicant:	March 15, 2002

II. Indications For Use

The Lorad Digital Breast Imager generates digital mammographic images that can be used for screening and diagnosis of breast cancer. The Lorad Digital Breast Imager is intended for use in the same clinical applications as traditional screen-film mammographic systems.

III. Device Description

The Lorad M-IV Mammography System is the host mammographic x-ray system for the LDBI. In conjunction with the M-IV system, the LDBI includes an image acquisition system and hard-copy display. The image acquisition system includes the digital image receptor, which is a large area array mosaic of twelve charge coupled devices (CCDs) optically coupled to a large area thallium activated cesium iodide (CsI:Tl) scintillator plate. The image receptor covers an area of 18.6 cm x 24.8 cm. At the Operator Control Panel, the user selects x-ray exposure technique factors and adds patient identification data. The LDBI also includes a workstation computer with a monitor, keyboard, mouse, interface electronics, and storage devices; an uninterruptible AC power supply; and DC power supplies. The Workstation Computer acquires, processes and displays the digital images. The images are then processed for printing and are transmitted to the peripheral hard copy laser film printer. Contrast and brightness are set automatically or they can be user adjusted prior to printing.

Users must ensure that they receive training on the LDBI with Lorad training programs prior to use on patients. Lorad training programs will address the new MQSA training regulations in product labeling to ensure that prospective users are aware of the required eight hours of training for any medical physicist, technologist, or interpreting physician.

IV. Contraindications

There are no known contraindications.

V. Warnings and Precautions

The warnings and precautions can be found in the LDBI labeling (Attachment 1).

VI. Potential Adverse Effects of the Device on Health

No serious adverse events were reported for the patients enrolled in the clinical study. However, potential adverse effects of mammography include

excessive breast compression
excessive x-ray exposure
electric shock
infection
skin irritation, abrasion or puncture wound.

VII. Alternative Practices and Procedures

Various methods are available for screening and diagnosing of breast cancer. These include a clinical breast examination, screen-film mammography, ultrasound, and magnetic resonance imaging. A biopsy of an abnormality detected with these exams is often obtained to diagnose the cancer.

VIII. Marketing History

The Lorad Digital Breast Imager is currently marketed in Europe and Asia. No LDBI has been withdrawn from marketing for reasons related to safety or effectiveness of the device.

IX. Summary of Non-Clinical Studies

Hologic conducted testing to demonstrate the imaging performance of the LDBI. As appropriate, results were compared to traditional screen-film mammography.

Comparison of Sensitometric Response of the LDBI and Screen-Film

As illustrated in Figure 1, the film's characteristic curve (commonly called the H&D curve) has a non-linear response for screen-film image receptors used in mammography. The film has high contrast response only within a narrow range of exposure, where the slope of the curve is steepest and the contrast is most observable (narrow exposure latitude). Even with firm compression of the breast, the range of exposures present at the exit surface of the breast exceeds the range over which the gradient of the screen-film combination is optimal. The LDBI detector shows a response that is linear to x-ray exposure, as illustrated in Figure 1. The gray scale conversion is linear and independent of exposure. The range of exposures over which the image contrast is observable (exposure latitude) for the LDBI is approximately four times greater than that of screen-film.

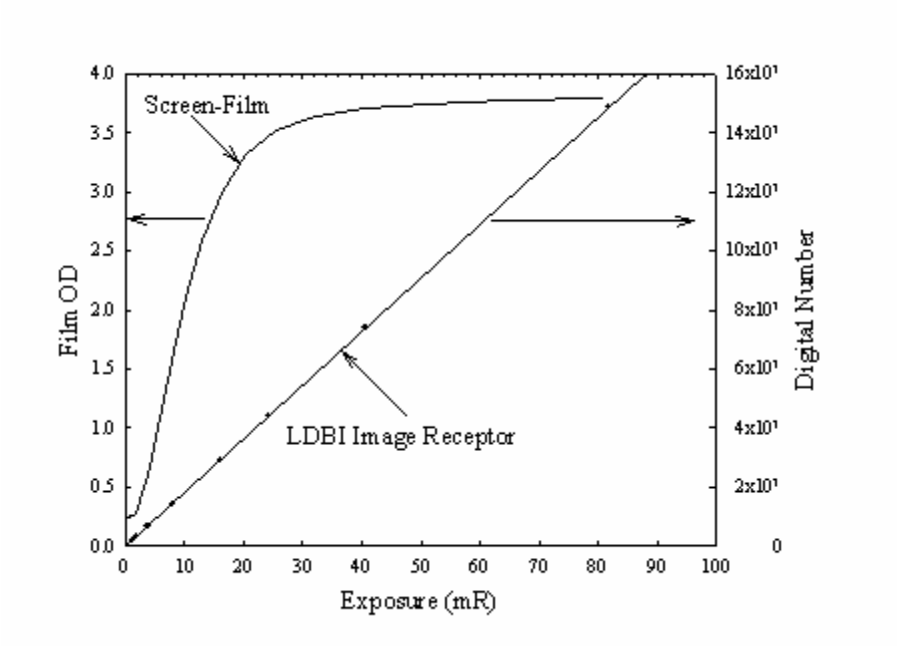

Figure 1. Sensitometric response curve of the LDBI image receptor compared to a widely used screen-film image receptor.

Comparison of Spatial Resolution Performance of the LDBI with Screen-film

The image sharpness is characterized by measuring the image receptor modulation transfer function (MTF), and also by measuring the limiting spatial resolution. The spatial sampling frequency is 40 μm, which results in a Nyquist frequency limit of LDBI of 12.5 c/mm.

Figure 2 shows the measured pre-sampled MTF curves in the x- and y-directions for a LDBI image receptor. MTF values are about 0.70, 0.30, and 0.06 at spatial frequencies of 2, 5, and 10 c/mm, respectively. The MTF curves of three screen-film mammography image receptors are also plotted in Figure 2 for comparison.

Screen-film image receptors exhibit higher MTF than the digital image receptor. However, this apparent resolution advantage of screen-film can be demonstrated only by using very high contrast objects such as lead bar resolution pattern. In screening mammography, detection of microcalcifications presents the highest spatial resolution requirement. For example, the smallest simulated calcification in the ACR accreditation phantom is about 160 μm. These sizes of calcifications, even though far less than 10 c/mm in the corresponding spatial frequency domain, are not visible on screen-film images using screening mammography techniques due to the presence of image noise.

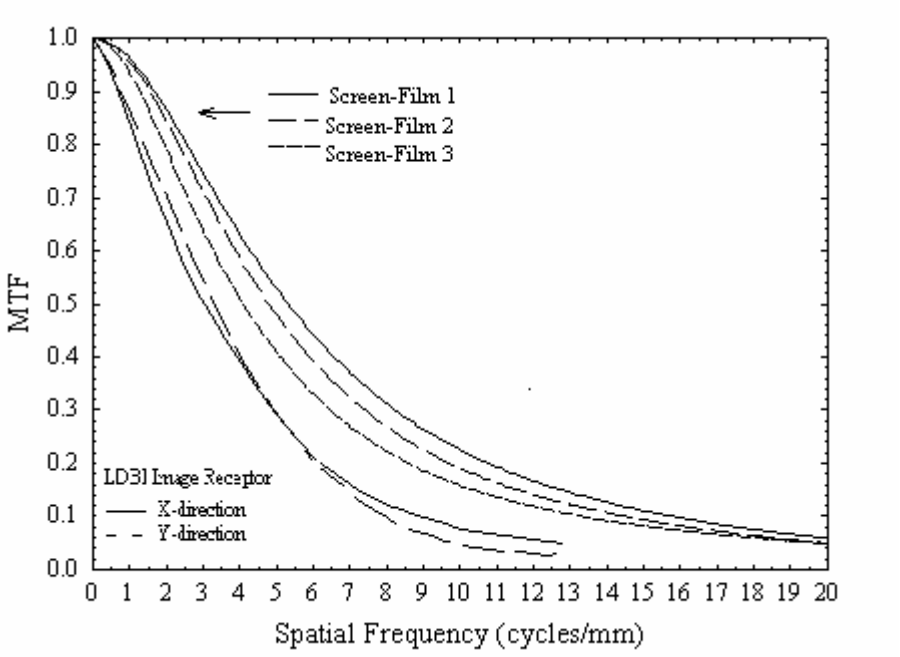

Figure 2. Modulation transfer function (MTF) of a LDBI Image Receptor compared to three screen-film image receptors

Detective Quantum Efficiency

To demonstrate the performance of an imaging system, the output signal-to-noise ratio (SNR) of the system can be compared with the SNR of the incoming x-ray photon stream. The ratio of the square of these two SNR's is called the detective quantum efficiency (DQE). DQE is also a measure of the efficiency at which information content is transferred and preserved.

Figure 3 shows an overlay of the DQE's of the LDBI digital image receptor measured at 13.0 mR (nominal mammography exposure) and 1.7 mR (under very dense breast) compared to the DQE of a typical screen-film image receptor measured at 13.0 mR. The curves indicate that the DQE of the LDBI digital image receptor are higher than that of the screen-film image receptor measured at 13 mR up to a spatial frequency of 5 c/mm, even at the low exposure level of 1.7 mR.

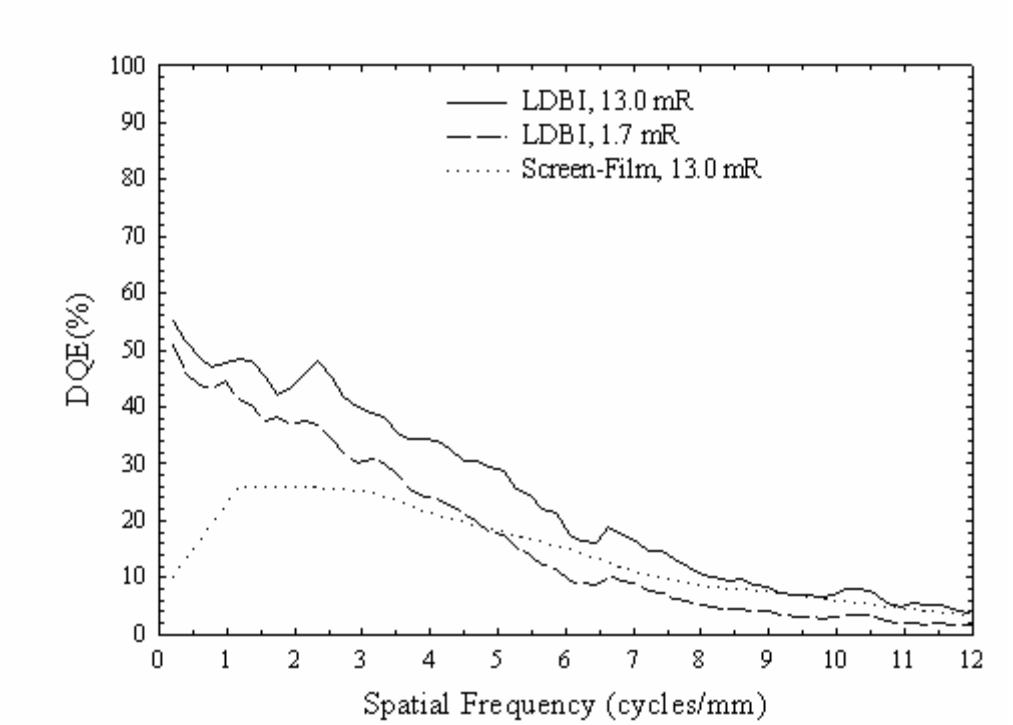

Figure 3. Comparison of DQE's of the LDBI at 1.7 mR and 13.0 mR with the DQE of a typical screen-film image receptor at 13.0 mR.

Exposure Dynamic Range

DQE of an ideal image receptor is independent of the x-ray exposure level. In other words, the image SNR^2 is proportional to x-ray exposure to the ideal image receptor. For a digital image receptor, however, the electronics noise contribution (CCD dark current, read noise, digitization noise, etc.) could become dominant at the very low x-ray exposure levels where the x-ray quantum noise is very low. In this case, the image SNR^2 may deviate from its linear relationship with x-ray exposure.

A LDBI image is formed by 12 CCD sub-images. The electronic noise content is different for each of the 12 CCDs. One convenient way to assess the performance of all 12 CCDs is to measure the image SNR for each CCD at different x-ray exposure levels. Figure 4 plots the SNR^2 measured on 12 CCD sub-images as a function of x-ray exposure to the image receptor. SNR was computed as the ratio of the mean to the standard deviation of all pixel intensities in a central 800 x 800-pixel area on each CCD. Figure 4 also demonstrates the relationship between SNR^2 and x-ray exposure for a screen-film system. SNR^2 values for screen-film system, derived from the measured data by PC Bunch (1998), are not absolute values, and are used here only to demonstrate that it responds differently to the x-ray exposure compared to the LDBI.

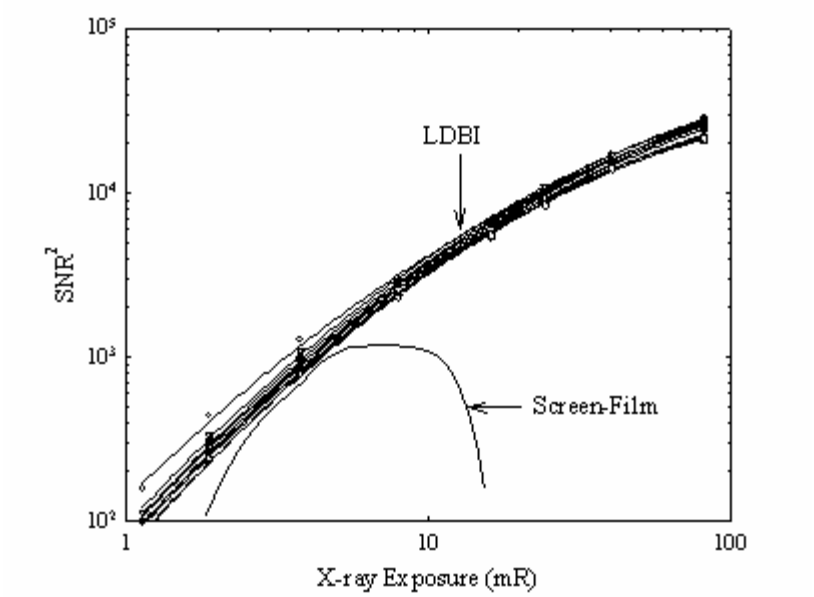

Figure 4. Square of the Signal-to-Noise ratio vs. image receptor entrance exposure for the LDBI and a screen-film system. The SNR^2 values for screen-film are not absolute values.

At exposure levels below ~2 mR and above ~40 mR, LDBI image receptor SNR^2 deviates slightly from its linear relationship with x-ray exposure. This is the result of electronic noise effect at very low exposure levels and CCD non-linearity (saturation) at very high exposure levels. Nevertheless, in comparison to the screen-film system, the LDBI has significantly improved performance over a much wider x-ray exposure range.

Phantom Scoring

Subjective scoring of the CD-MAM phantom and the ACR phantom are used to qualify the detection capabilities of the LDBI. For comparison, screen-film mammography has also been included. The exposures for both screen-film and LDBI were identical, and were determined by the AEC technique for optimal film density using a representative screen-film system. The results in Figure 5 and 6, show that LDBI has equal or better performance in detecting features in these phantoms.

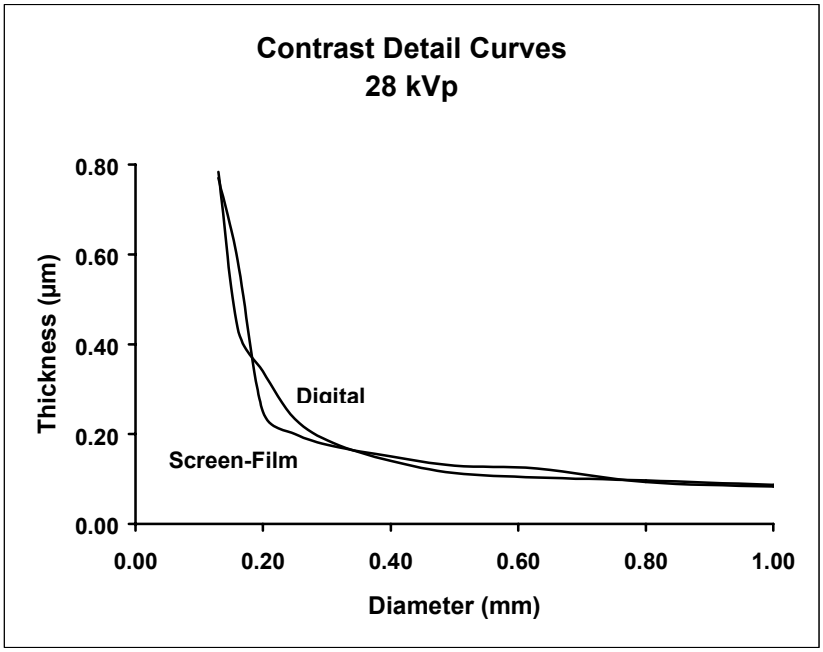

Figure 5. Contrast Detail Curves Comparing LDBI and Screen-Film Images

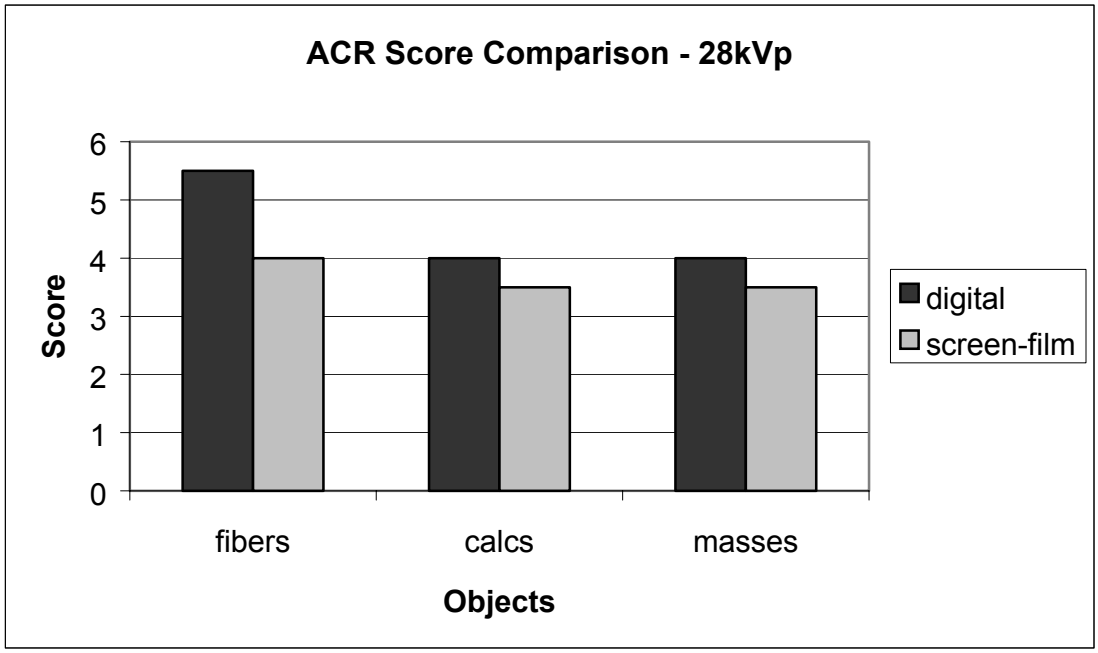

Figure 6. Comparison of ACR Phantom Scores

Patient Radiation Dose

Average glandular dose was determined for three breast thicknesses (3.0, 4.5, and 6.0 cm) and three breast compositions (30%, 50%, and 70% glandular). Radiation exposures were measured using the Autotime exposure mode. The x-ray tube kVp and filter combinations were selected using a recommended look up table based on breast thickness and density.

Table 1 shows the x-ray techniques and the corresponding average glandular dose data for the 50% glandular breast phantom. The measured average glandular dose to a 4.5-cm thick average breast in the LDBI is about 150 mrad. This dose level is significantly below the maximum average glandular dose requirements by both MQSA (300 mrad) and some states in U.S., Canada, and some countries in Europe (200 mrad).

Table 1. Average glandular dose to 50% glandular breast.

Breast Thickness (cm)	kVp	mAs	Entrance Skin Exposure (R)	Dose Conversion Factor (mrad/R)	Average Glandular Dose (mrad)
3.0	25	43.3	0.433	217	94
4.5	28	60.5	0.920	167	154
6.0	28	144.0	2.303	123	283

Conclusions Based on Non-clinical Testing

- The signal response of the LDBI is linear, and the exposure latitude is significantly wider than that of screen-film.
- The Nyquist frequency of the LDBI is 12.2 c/mm. The MTF at the Nyquist frequency is approximately 5%.
- At the same exposure level, the detective quantum efficiency (DQE) of the LDBI is higher than screen-film up to its Nyquist frequency limit (12.2 c/mm)
- At nominal mammography exposure of approximately 13 mR, the low frequency DQE of the LDBI is approximately two times higher than that of a typical screen-film combination. At higher (near the skin line) and lower exposure levels (near the chest wall and under dense glandular tissue or chest wall), the greater dynamic range of the LDBI will also provide a DQE higher than screen-film at comparable exposure levels.
- The DQE data correlates with phantom scoring results using the CD-MAM and ACR phantoms. The images from the LDBI provide consistently superior visualization of phantom lesions, when compared to screen-film images at the same exposures.
- The wide exposure latitude and high DQE throughout a wide range of exposures has the potential of minimizing the need for repeated exposures (reduced patient dose) due to exposure errors or the need to optimize the exposures to specifically view the skin line or chest wall.
- The patient dose from using the LDBI is similar to the conventional screen-film mammography systems. Average glandular dose to a standard phantom is significantly below the MQSA limit of 300 mrad.

X. Summary of Clinical Studies

Study Population

A readers' study with an enhanced cancer population was performed. The study cohort consisted of 200 patients, 48 pathology-proven cancers and 152 negatives, for a total of 400 mammography cases (200 screen-film exams and the 200 corresponding digital exams). Images were acquired from four institutions: University of Virginia, University of California Los Angeles, Good Samaritan Hospital of West Islip, New York, and Thomas Jefferson University Hospital.

The following inclusion criteria were used to enroll women into the study

- female
- age 40 years or older
- any ethnic origin
- no contraindications for routine bilateral mammography
- undergoing either routine screening mammography or follow-up diagnostic mammography.

Women were excluded from the study because of

- any contraindications to mammographic screening, including
  - palpable abnormalities
  - significant existing breast trauma
  - breast implants
  - pregnancy
- inability to understand and execute written informed consent.

Patient Demographics

Table 2 defines the study population according to age at time of exam and race.

Table 2. Patient Demographics

Characteristic	**Overall**
Age (years): Mean±SD	**56.3 ± 9.4**
Range	**39.8 - 90.6**
Median	**55.7**
Ethnicity	
Caucasian	**167 (83.5%)**
African American	**21 (10.5%)**
Asian	**5 (2.5%)**
Other	**3 (1.5%)**
Unknown	**4 (2.0%)**

Tumor Characteristics

The total number of verified cancers in the study was 48. Of these 48 cancers, 18 (37.5%) were in the right breast, 29 (60.4%) in the left breast, and 1 (2.1%) was bilateral. Table 3 illustrates the distribution of patients by institution and cancer status.

Table 3. Distribution of Patients by Institution and Cancer Status

Institution	A	B	C	D	Total
No Cancer	96 (63.2%)	29 (19.1%)	26 (17.1%)	1 (0.7%)	**152**
Cancer	16 (33.3%)	10 (20.8%)	0 (0.0%)	22 (45.8%)	**48**
Total	**112 (56.0%)**	**39 (19.5%)**	**26 (13.0%)**	**23 (11.5%)**	**200**

Forty-four (44) patients (91.7%) had a single cancerous lesion, and 4 patients (8.3%) had 2 lesions. Cytology results for single cancerous lesions were atypical (lobular carcinoma in situ – LCIS) in 4 patients (9.1% of 44) and malignant in the remaining 40 (90.9% of 44). Cytology results in the 4 patients with 2 cancerous lesions were malignant for all cancerous lesions. Histology results for cancerous lesions were in perfect agreement with cytology results. Table 4 provides additional characteristics of the cancers identified.

Table 4. Characteristics of Cancerous Lesions, Based on Pathology Results Apply to Both Lesions in Patients With Two Cancerous Lesions (n=4).

Characteristic	A (n=16)	B (n=10)	D (n=22)	Overall
Grade				
Low	6 (37.5%)	1 (10.0%)	0 (0.0%)	**7 (14.6%)**
Moderate	4 (25.0%)	2 (20.0%)	12 (54.6%)	**18 (37.5%)**
High	3 (18.8%)	7 (70.0%)	5 (22.7%)	**15 (31.3%)**
Not applicable/Unknown	3 (18.8%)	0 (0.0%)	5 (22.7%)	**8 (16.7%)**
Based on LDBI mammogram:				
Largest diameter (mm): n	15	10	22	**47**
Mean±SD	15.6±11.1	24.4±10.4	20.0±11.1	**19.6±11.2**
Range	5 - 50	12 - 40	6 - 45	**5 - 50**
Median	14	25	20	**15**
Interquartile range	9 - 18	15 - 30	10 - 25	**10 - 25**
Proportion ≤ 1 cm	6 (40.0%)	0 (0.0%)	6 (27.3%)	**12 (25.5%)**
Based on screen film mammogram:				
Largest diameter (mm):n	14	10	22	**46**
Mean±SD	15.7±11.5	24.2±10.0	19.0±10.3	**19.2±10.8**
Range	6 - 50	12 - 45	3 - 40	**3 - 50**
Median	12.5	21	18.5	**18.5**
Interquartile range	8 - 20	18 - 30	12 - 25	**12 - 25**
Proportion ≤ 1 cm	6 (42.9%)	0 (0.0%)	5 (22.7%)	**11 (23.9%)**
Diagnosis*				
LCIS	3 (18.8%)	0 (0.0%)	1 (4.5%)	**4 (8.3%)**
DCIS	3 (18.8%)	5 (50.0%)	9 (40.9%)	**17 (35.4%)**
Invasive	2 (12.5%)	3 (30.0%)	7 (31.8%)	**12 (25.0%)**
LCIS, Invasive	1 (6.3%)	0 (0.0%)	0 (0.0%)	**1 (2.1%)**
DCIS, Invasive	5 (31.3%)	1 (10.0%)	5 (22.7%)	**11 (22.9%)**
DCIS, Other	1 (6.3%)	1 (10.0%)	0 (0.0%)	**2 (4.2%)**
Other Invasive	1 (6.3%)	0 (0.0%)	0 (0.0%)	**1 (2.1%)**

*LCIS = lobular carcinoma *in situ*, DCIS = ductal carcinoma *in situ*

The Agency for Healthcare Research and Quality (AHRQ) "Clinical Practice Guidelines #13: Quality Determinants of Mammography" specifies that a good mammography program includes more than 30% minimal cancers (i.e., ≤ 10 mm or in situ ductal carcinoma). Table 4 shows that the sample of patients in Study III satisfies this requirement, both overall and within each institution from which cancer cases were drawn. Thirty-six percent (36%) of the cancers were characterized as ductal carcinoma in situ (DCIS). The proportion of DCIS lesions in this study group compared favorably to an audit of a large UCSF screening series discussed by Edward Sickles, M.D. in the RSNA Categorical Course in Breast Imaging 1995; pp 81-91; Table 9. Adding patients with lesions ≤ 10 mm in their largest diameter increases the percentage of minimal cancers to 51% (using largest diameter from digital mammogram) or 48% (using largest diameter from screen-film mammogram). This compares favorably to what others have noted to be one of the benchmarks to evaluate a good screening program, namely, that more than 50% of the screen-detected cancers should be smaller than 15mm (Smith, RA, 1997).

The available accrued data relating to the size distribution of the lesions in this study cohort were representative of and comparable to previously published data from the analysis of screening mammogram programs of larger populations. In addition, this study meets or exceeds the desirable goals of lesion size detection to be achieved in the medical audit of a quality mammographic practice facility as recommended in the AHRQ Clinical Practice Guideline Number 13: Quality Determinants of Mammography.

Table 5. Characteristics of cancerous lesions with respect to AHCPR guidelines

Characteristic	A (n=16)	B (n=10)	D (n=22)	Overall
Based on digital mammogram:				
n	15	10	22	**47**
Largest diameter ≤ 1 cm	6 (40.0%)	0 (0.0%)	6 (27.3%)	**12 (25.5%)**
Proportion DCIS	3 (20.0%)	5 (50.0%)	9 (40.9%)	**17 (36.2%)**
Either of the above	7 (46.7%)	5 (50.0%)	12 (54.5%)	**24 (51.1%)**
Based on screen film mammogram:				
n	14	10	22	**46**
Largest diameter ≤ 1 cm	6 (42.9%)	0 (0.0%)	5 (22.7%)	**11 (23.9%)**
Proportion DCIS	3 (21.4%)	5 (50.0%)	9 (40.9%)	**17 (36.2%)**
Either of the above	7 (50.0%)	5 (50.0%)	10 (45.5%)	**22 (47.8%)**

Reader Study Design

Twelve MQSA-qualified radiologists interpreted the screen-film and LDBI mammograms. The readers were not aware of the patient's history or any other diagnostic information. To reduce memory as a factor in film interpretation, reading of the screen-film and LDBI mammograms on the same patient were separated by an interval of at least four weeks. Images were read in an environment that simulated routine screening and diagnostic practice. Original screen-film mammograms and hard copy LDBI mammograms were viewed in random order on a multiviewer. Use of a magnifying glass was permitted.

Image Interpretation

Radiologists worked with a clinical research assistant, responsible for prompting the radiologist and recording the results on the appropriate case report forms. Radiologists were first asked to indicate the density of the breast parenchyma using the BIRADS lexicon (Table 6).

Table 6. BIRADS Lexicon for Breast Parenchyma Density

BIRADS Value	Parenchyma Density
1	Almost Entirely Fat
2	Scattered Fibroglandular Densities
3	Heterogeneously Dense
4	Extremely Dense

Next, the radiologist was asked if there were any mammographic findings present for the case. The types of abnormalities (i.e. masses, calcifications, architectural distortions, and asymmetric densities) were noted, and the radiologist was instructed to select the "most suspicious" finding. The case report form had breast profiles reproduced with a grid so that the radiologists could indicate the approximate location of the suspicious finding.

In addition, the radiologists were asked to indicate whatever additional workup they would recommend based on the present examination, including comparison to previous films, spot compression, magnification spot compression, ultrasound, biopsy, etc. The readers were then asked to assign an "estimated probability of malignancy for this patient (0-100%)." They were also asked to provide a BIRADS score for the case (Table 7). If, initially, they assigned a score of 0 (needs further evaluation), they were asked to assign another score of 1 to 5.

Table 7. ACR BIRADS Diagnostic Categories

1	Normal
2	Abnormal – benign
3	Abnormal – probably benign
4	Suspicious for cancer
5	Highly suspicious for cancer

Data from this study was used in assessing recall rates, sensitivity, specificity and Receiver Operator Characteristics (ROC) of LDBI compared to screen-film as recommended in the February 16, 2001 FDA Guidance Document “Premarket Applications for Digital Mammography Systems; Final Guidance for Industry and FDA.”

Features Analysis

After completing the reading of all the cases, a features analysis was carried out using the images from the 48 patients who were positive for cancer. The radiologists were shown side-by-side CC and MLO views of the screen-film and LDBI images from the breast positive for cancer. Each breast was shown for the patient with bilateral cancer. The radiologists were asked to rate the difference in image quality using a scale from -3 to +3 (Table 8) for six features (Table 9) including pathology (if present on the image). Their answers were captured on the appropriate case report forms. In all, 49 pairs of screen-film and LDBI images were shown to the radiologists for comparison.

Table 8. Image Quality Difference Criteria and Scores

Score	Descriptor
+3	LDBI is much better than SFM
+2	LDBI is better than SFM
+1	LDBI is slightly better than SFM
0	LDBI is similar to SFM
-1	SFM is slightly better than LDBI
-2	SFM is better than LDBI
-3	SFM is much better than LDBI

Table 9. Features for Image Quality Comparison

Lesion Conspicuity
Tissue Visibility at Chest Wall
Tissue Visibility at Skin Line
Axillary Details (MLO View Only)
Overall Contrast
Overall Sharpness

Results

There was a 5.5% decrease in initial BIRADS=0 classifications for the LDBI, compared with screen film mammography. This difference is statistically significant (p = 0.0197, 95% CI 1.07% to 10.05%). It is also clinically important, as BIRADS=0 classifications are associated with delays in receiving results of screening mammography (e.g., pending comparison to previous films), and/or recall of the woman into the clinic for further workup.

Table 10 summarizes the results. Note that one expects decreases in sensitivity and areas beneath estimated smooth ROC curves for the LDBI, due to the bias towards screen-film induced by the study design.

Table 10. Summary of Results of Analyses Concerning Accuracy of LDBI

Test	Outcome	LDBI *vs.* Screen Film	95% CI for Difference	p-value
BIRADS≥3	Specificity	+2.7%	(-1.9%, 7.2%)	0.2104
	Sensitivity*	-7.6%	(-12.9%, -2.4%)	0.0086
BIRADS≥4	Specificity	+2.0%	(-2.5%, 6.5%)	0.3449
	Sensitivity	-5.2%	(-11.5%, 1.1%)	0.0965
Workup Beyond Comparison to Previous Films	Specificity	+3.7%	(-1.1%, 8.5%)	0.1212
	Sensitivity*	-7.6%	(-14.9%, -0.3%)	0.0419
Recommendation to Biopsy	Specificity	+1.5%	(-0.0%**, 3.1%)	0.0514
	Sensitivity	-2.1%	(-0.7%, 2.9%)	0.3729
ROC: Stated Probability of Malignancy	Average A_z	-0.0343	(-0.0736, 0.0050)	0.0863
ROC: Final BIRADS Classification	Average A_z	-0.0442	(-0.0964, 0.0080)	0.0963

*$p < 0.05$

**Value before rounding is slightly less than zero.

Based on analyses of specificity, no statistically significant increases in false positive rates for the LDBI were observed compared to screen film mammography. The LDBI is not associated with

either an increase in unnecessary workups beyond comparison to previous films, or an increase in unnecessary biopsies. In fact, estimated differences point to probable decreases in false positive rates for the LDBI, including decreases in rates of unnecessary workup beyond comparison to previous films and in rates of unnecessary biopsies.

Analyses of sensitivity did show the bias against the LDBI that we expected due to the study design. Two of these estimated decreases in sensitivity were statistically significant. In clinical practice, when such bias does not operate, it is likely that no statistically significant differences in sensitivity would be observed.

Multivariate LABMRMC analyses show that the estimated difference in average area under the ROC curves for the LDBI compared with screen film mammography is not statistically significant, using either the stated probability of malignancy or the final BIRADS classification to estimate the ROC curves.

With respect to the features examined, the LDBI is similar to or slightly better than screen film mammography. In total, readers rated mammograms from the LDBI similar to or at least slightly better than screen film mammograms 82.5% of the time for lesion conspicuity, 95.1% of the time for tissue visibility at the chest wall, 86.7% of the time for tissue visibility at the skin line, 99.5% of the time for axillary details, 98.8% of the time for overall contrast, and 93.5% of the time for overall sharpness.

XI. Conclusions Drawn From Non-Clinical and Clinical Studies

The results of the non-clinical and clinical studies described above provide a reasonable assurance of the safety and effectiveness of the LDBI for screening and diagnostic breast imaging. These findings therefore support FDA approval of the LDBI for clinical use in screening and diagnostic mammography.

XII. Panel Recommendation

In accordance with the provisions of section 515(c)(2) of the act as amended by the Safe Medical Devices Act of 1990, this PMA was not referred to the Radiological Devices Advisory Panel, an FDA advisory committee, for review and recommendation because the information in the PMA substantially duplicates information previously reviewed by this panel.

XIII. FDA Decision

The applicant's manufacturing facility was inspected on December 10 and 18, 2001 and was found to be in compliance with the Quality Systems Regulations. FDA issued an approval order on March 15, 2002.

XIV. Approval Specifications

Directions for use: See the attached labeling.

Hazards to Health from Use of the Device: See Contraindications, Warnings, Precautions and Adverse Reactions in the attached labeling.

Post-Approval Requirements and Restrictions: See approval order.